maps, their scale and mode of colouring being, it is stated, based on a definite system. The work is one of Philip's Geographical Series, which is edited jointly by Mr. Ravenstein, Mr. J. Scott Keltie, and Mr. Mackinder.

An admirable discussion of projections, scales, and measurement on maps with diagrams, is the most interesting part of the introductory text, and these difficult questions are handled with rare conciseness and clearness. The name of the projection and the natural scale are given for every map—a most useful innovation. An original diagram, showing the relative heights, depths, and curvature of the surface of the globe along the equator, and the parallels 30°, 45°, and 60° N. and S. gives a very striking view of the vertical relief of the earth. Ten plates are devoted to general physical geography, and although the scale is small, and the features consequently much generalised, they are clear and satisfactory. The rainfall maps on plate 5 are particularly interesting, including two which are entirely new, representing the average number of rainy days in different parts of the world, and the relative humidity of the atmosphere. Equal praise cannot be given to the maps dealing with the distribution of plant and animal life, the names on which are frequently puzzling, and the species selected for treatment curiously unequal.

The maps of continents and countries, which make up the bulk of the atlas, show configuration by a combination of contour lines and tints with hill-shading. Here we regret that Mr. Ravenstein had not courage to disregard the conventional strong green tint for the lowlands, and to adopt an unbroken system of deepening shades of brown. It is noticeable, also, that the application of the green tint is unsystematic, extending to 300 feet in some maps, to 600 in others, and in one at least to 3000 feet above sea-level. A similar break in the system of indicating density of population is sure to give rise to confusion; the same shade being used to represent regions of over 512 inhabitants to the square mile in Europe, those over 256 in Asia, over 64 in Africa, and over 32 in America. There are several minor defects visible in the maps, such as the omission of links in the through railway system, and difference in the representation of county-boundaries in the maps of England and Scotland, but these are not more frequent than in atlases of much greater pretensions, and will of course disappear in a new edition. The colour-printing of many of the maps may also be improved.

A great feature of the work is the number of inset maps, garnishing the margins of larger plates with enlargements of regions of special interest, or small-scale general maps showing geology, climate, vegetation, race, language, or density of population. In this way the fact that there are as many maps as there are sciences involving distributions is kept to the front, and the teacher or scholar using this atlas is led to see that geography is no haphazard agglomeration of disconnected details, but a shapely system incorporating and elucidating the results of all departments of nature-study. We know of no atlas in any language in which the systematic plan has been more successfully elaborated, the exceptions we have noted above being thrown into undue prominence by the general excellence of the whole.

OUR BOOK SHELF.

Life and Rock: a Collection of Zoological and Geological Essays. By R. Lydekker, B.A., F.G.S., &c. *Knowledge* Series. (London: Universal Press, 1894.)

Mr. Lydekker's name is well known as that of a popular exponent of the results of zoological and palæontological research. The essays which he collects under the title of "Life and Rock," and which deal with a wide range of zoological subjects, from elephants to what he terms "forams," will serve to sustain his reputation in this respect. Mr. Lydekker's chief aim is to convey information which shall not be couched in terms so technical as to discourage those who have neither the inclination nor the desire to become serious students. In this he is eminently successful. His language is simple, clear and direct, without any attempt at a distinctive style; and he shows good judgment in drawing the line beyond which his readers would not be able to follow him, nor care to make any effort to do so. Above all he is accurate, and his information may be relied on as up to date. We question, however, his wisdom of speaking in a book of this popular kind of "those writers who explain evolution by some mode of what *they are pleased to call* natural selection"; and of "those who put their faith in a mode of evolution dependent only upon *so-called* natural causes." Let us by all means have the best and most forcible available criticism on natural selection as a valid explanation of the observed facts of organic nature and on the evolution of living and extinct beings by processes which are termed natural. Such criticism is the very life of science. But the words we have italicised are mere side-thrusts, which do the reader no good, and the writer no credit.

Disease and Race. By Jadroo. (London: Swan Sonnenschein and Co., 1894.)

"To show some continuity in disease, to evolve a little order out of the existing chaos," these were the objects which led the author to write this book. He collects inoculable diseases, and arranges them in a genealogical table, which is suggestive, to say the least of it. Tuberculosis is shown to be descended directly from scrofula, and scrofula from syphilis, which in turn is regarded as having descended from leprosy. Other diseases are supposed to be connected in a similar manner, though the grounds upon which the supposition is based are not very firm in many cases. The chief point to which the arguments lead is that "every contagious or infectious disease, by either the formation of a hybrid, or by hereditary transmission of the individual modification, tends to eradicate itself." The author is strongly in favour of the establishment of institutes for the purpose of research into the bacteriology, etiology, epidemicity, and sequence of diseases. As there is a dearth of human subjects upon which to experiment, he suggests that convicted murderers should be given the option of death or the probability of leading a comparatively comfortable existence in a bacteriological institute. It has been said that "the worst use you can put a man to is to hang him"; and certainly, if a murderer were used as a medium for the cultivation of bacteria, he would expiate his offence in a very suitable manner.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected anuscripts intended for this or any other part of* Nature. *o notice is taken of anonymous communications.*]

The Mass of the Earth.

This month's *Philosophical Magazine* contains an interesting, instructive, and suggestive, criticism of Prof. Poynting's

© 1894 Nature Publishing Group

Adams prize essay on "The Mean Density of the Earth," in which I have to-day read the following paragraph :—

"The author is to be congratulated on the strictly scientific title under which he describes his work—'The Determination of the Mean Density of the Earth,' or 'The Determination of the Constant of Gravitation,' instead of the utterly unmeaning 'Determination of the *Weight* of the Earth,' which is found even in such a work as Arago's *Popular Astronomy*, and which is a characteristic of too much of our modern popular science *à la mode*. Have we not seen in some old and popular treatise a picture of 'the room in which Mr. Baily *weighed* the earth'? It is to be hoped that some day our leading authorities will be induced to abandon that fatal dogma which is still, unfortunately, 'of great emolument'—that science, to be popular must, above all things, be inaccurate."

As comment, I remark that the earth's weight, or mass, is $6{\cdot}14 \times 10^{21}$ tons. What is unmeaning or unscientific in this clear, intelligible, and accurate statement?

Prof. Poynting's work was in fact, directly and simply, a weighing of the earth against a lead weight on the same principles, and by the same instrument, as a grocer weighs a quantity of tea against brass or iron weights, with inference calculated by aid of the additional knowledge of the earth's radius. "The determination of the constant of gravitation" is a deduction requiring, not a knowledge of the earth's radius, but the knowledge (derived from pendulum experiments) of the gain of velocity, per unit of time, which a free falling body would experience at the place of the gravitational weighings. The critic is of course quite right in applauding Prof. Poynting's double title, but he is not right in decrying the simple, clear, and scientific expressions, "weighing the earth" and "the weight of the earth."

In Cavendish's original experiment, and in Baily's repetition of it, and in Cornu's corresponding experiment with mercury instead of lead, the more immediate result is "the constant of gravitation": the weight of the earth and the earth's mean density are deductions.

The "constant of gravitation" is not a very good or logical expression, though it is not quite so bad as "coefficient of friction," or "coefficient of thermal conduction," or "coefficient of self-induction."

"Constant of gravitation" does not explain itself, either to the learned scientific mind, or to the intelligent, non-scientific, reader.

K.

April 10.

The Royal Society.

It may interest your readers to see the kind of foundation on which rumours with regard to the Royal Society are based. The following paragraph is from the *Daily Chronicle* of April 16, and the fact is that neither the Council nor the officers have as yet met to consider the claims of the numerous candidates.

John Evans.

The Royal Society, Burlington House.

"It is reported that the list of successful candidates for admission into the Royal Society, which will be issued in a few days, is not calculated to allay the acrid criticism to which the council has of late been subjected. Far apart from its containing some very obscure names, and rejecting some much more notable ones, the official selection, if all tales are true, will exhibit more than ever the influence of that "professorial" element into whose hands the Society has been getting more and more every year. The election of Sir Henry Howorth, which few approved of, was really due to his rejection being advocated by that unpopular clique, the members at large protesting in their rather futile fashion against the nepotism of University and South Kensington officials. This year, however, the college tutor and the tripos hero is said to be more and more in favour. By the way, it is curious to find that Mr. Selous, who has contributed so many papers to the Royal Geographical Society and was one of its gold medallists, has only now cared to be elected a Fellow. But neither Nansen nor Hector, who shared in the same distinction, are enrolled in the Society's membership. One would imagine that a medallist ought to be an honorary Fellow, more especially as some very peculiar people appear *dans cette galère*."

Lepidosiren paradoxa.

The villi of the pelvic fins of this fish, referred to by Prof. Lankester in the last issue of Nature, have been already briefly described by Prof. Ehlers (*Nachr. Kais. Gesellsch. der Wiss. Göttingen*, 1894, No. 2), as was shown by Dr. Günther in commenting upon them before the Zoological Society on the 3rd inst. Dr. Günther advanced good reason for regarding the villi as sexual and confined to the male, as is implied in Prof. Lankester's letter. A specimen of a fine male has recently come into my hands, in which, in contradistinction to all others yet described in print, the "anus" (cloacal aperture) is located to the right of the median ventral fin; and it is thus proved that *Lepidosiren*, like *Protopterus*, is individually variable in the inter-relationship of these two parts of its body. Being aware that Brock had recently described the histological structure of dendritic processes occurring in the neighbourhood of the genital orifice, in the male of *Plotosus* (*Copidoglanis*) *anguillaris* and in the two sexes of *Gasterotokeus biaculeatus*, I requested my pupil Mr. J. Sumner to make sections of those of *Lepidosiren*, hoping that erectile tissue and tactile organs, such as Brock describes, might have been present. We can find neither. The villi are highly vascular and non-muscular. Dr. Bohls, who captured the specimens that have lately reached Europe, has signified his intention of working out these structures in full; and it is fair to him to assume that he is in possession of material specially prepared for the purpose.

My specimen is further remarkable for an inequality in growth of the pelvic fins—that of the (right) side on which the cloacal aperture occurs exceeding its fellow in length by a quarter of an inch; and, in view of Prof. Lankester's assertion that the forward position of the pelvic fin is one "which the animal can give it in life," the fact that the right pectoral is in my specimen forwardly thrust into the branchial chamber may not be without interest.

No one can doubt the generic distinction of *Lepidosiren* and *Protopterus*; indeed, the late Dr. Anton Schneider fully established this, in reply to Ayers' proposal to regard them as mere varieties of a common species. And it may be incidentally remarked that prior to the acquisition of Dr. Bohl's specimens, authoritative records of six museum preserved examples were established (*cf.* Nature, vol. xxxviii. p. 126).

G. B. Howes.

Royal College of Science, April 16.

The Aurora of March 30.

On the night of March 30 there occurred here an exceptionally brilliant auroral display, remarkable, in this latitude, in several respects. When I saw it I was a few miles north of the city proper, and the southern horizon was lit up by the lights in town, so that any faint display near the horizon to the south would have been obscured. I first noticed the aurora about 8.30 p.m. (75th meridian east of Greenwich time), and it continued till midnight, but was much fainter and confined to a simple glow in the north-west to north-east after about ten o'clock. When first noticed, the sky from east to west round by north was either quite deep red or reddish white. No clouds were then visible, and there were no streamers, though the glow extended about to the zenith. Then, as the red grew fainter, a few small clouds formed in the north, and the *still* glow was confined to the sky from east to west along the horizon, and about 50° above it in the north, but less in the east and west. From this arch of light, streamers shot up, not only from the north but from east and west (or east by south and west by south), and met in a place about 10° *south* of the zenith. These streamers pulsated rapidly, the light at times starting at the arch of (apparently) still glow and travelling without break to the point of meeting. At other times the glow would appear in places along the course of the former streamers—first near the arch, then further on, disappearing again, to again appear nearer the zenith. When these rays met in the place south of the zenith, their paths sometimes crossed, but more generally the rays seemed to mingle and either form a roundish glowing spot about 5° to 10° across, or a roundish, confused mass of glow that looked like glowing smoke. Occasionally an appearance like a hollow-centred whirlpool appeared. When the rays met

© 1894 Nature Publishing Group